ATTO Technology, Inc.

ATTO™ FibreBridge™ 1180E/D

Installation and Operation Manual

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Contents

1 Fibre Channel is a key technology for storage

Fibre Channel is a serial communications technology designed to transfer large amounts of data between a variety of hardware systems over long distances. It is a key technology for applications that require shared, high bandwidth access to storage.

Fibre Channel provides a logical point-to point serial channel for the transfer of data between a buffer at a source device and a buffer at a destination device. It moves buffer contents from one port to another, without regard to the format or meaning of the data, so different upper level protocols are able to run over Fibre Channel hardware.

The Fibre Channel architecture is structured as a hierarchical set of protocol layers. Defined within these layers are rules for signal interfaces, serial encoding and decoding, error control, frame format and communications protocols.

All ATTO™ FibreBridge™ models can be used in a SAN (Storage Area Network) to connect a variety of Fibre Channel and SCSI devices to meet your needs.

A SAN is a shared storage architecture connecting computers and storage devices for online data access. Each connected system can directly access any attached storage device. Storage devices could include RAID, tape backup, tape library, CD-ROM library or JBOD.

SANs maintain greater fault tolerance and load balancing by supporting server clustering and failover (the ability for one server to take over for another in the event of a failure).

ATTO FibreBridge models provide the interface between SCSI and Fibre Channel resources in SANs. Possible configurations depend upon your current hardware and what you need to do.

Glossary

Some terms used in the Fibre Channel industry are defined below. More information is available through the Fibre Channel Industry Association (www.fibrechannel.com), *the Storage Area Networking Industry Association* (www.snia.org) *and the Fibre Channel Consortium* (www.iol.unh.edu).

Term	Definition
fabric	A Fibre Channel switch or two or more Fibre Channel switches interconnected to physically transmit data between any two N_Ports on a switch or switches.
failover	The substitution of a working system for one which has failed.
FC-AL	Fibre Channel Arbitrated Loop: A Fibre Channel network in which up to 126 systems and devices are connected in a loop topology, with each transmitter connecting to the receiver of the device to its logical right. The Fibre Channel Arbitrated Loop protocol used for transmission is different from Fibre Channel switched and point to point protocols. Multiple FC-AL loops can be connected via a fabric switch to extend the network.
firmware	Software stored in read-only memory (ROM) or programmable ROM (PROM). Firmware is often responsible for the behavior of a system when it is first switched on.

Term	Definition
F_port	A port in the Fibre Channel fabric where a N_port may attach
FL-port	A port in the Fibre Channel fabric where a NL_port may attach in an arbitrated loop
hot swapping	Components are removed and replaced while the unit is running, with power to either the component or a device connected to the unit. Not all components are hot swappable: please read installation and maintenance instructions carefully.
initiator device	A component which originates a command
JBOD	Just a Bunch Of Disks: a storage subsystem using multiple independent disk drives with or without RAID configuration.
LED	Light-emitting diode, a type of diode that emits light when current passes through it. Visible LEDs are used as indicator lights on all sorts of electronic devices.
LUN	Logical Unit Number: a SCSI or Fibre Channel identifier of a device
NL port	a port attached to a node in Fibre Channel arbitrated loop or fabric loop configurations
N_port	a port attached to a node used with point to point or fabric configurations
RAID	Originally Redundant Array of Inexpensive Disks, now Redundant Array of Independent Drives: a storage system spanning multiple disk drives. The following standard RAID specifications will be used here: RAID 0: disk striping in which fixed-length sequences of data are mapped to member disks in a regular rotating pattern. RAID 1: Mirrored arrays: information written to one disk is also written to another simultaneously. Also known as disk shadowing, real-time copy, and t1 copy. RAID 10: Striped array with mirroring
SCSI	Small Computer Systems Interface: a processor-independent standard for system-level interface between a computer and intelligent devices including hard disks, floppy disks, CD-ROM, printers, scanners, etc.
topology	logical layout of the parts of a computer system or network and their interconnections

2 ATTO FibreBridge supports diverse SAN needs

The ATTO FibreBridge family of products provides Fibre Channel-to-SCSI bridges available as standard PCI boards, stand alone enclosures that can be fitted for rackmount integration, or desktop units, depending on the model and your needs (see Exhibit 2-1).

The ATTO FibreBridge family of products share common configuration options and functions to provide the most versatile connectivity options available. Each product has been engineered to address specific customer needs. New capabilities are integrated into products throughout the FibreBridge family as much as possible, requiring only an upgrade of firmware to incorporate them into your SAN (see Chapter 10). To make sure you have the most up-to-date version of the firmware, visit the ATTO Technology website, www.attotech.com.

All ATTO FibreBridge models include full duplex mode, Class 2 transfers and direct fabric connect capabilities and are operating system independent.

Please refer to the Technical Specifications for complete information about your FibreBridge model.

Quick start instructions

If you are familiar with the ATTO FibreBridge family of products, you will be able to use quick start instructions to implement the FibreBridge 1180E/D into your system.

The ATTO FibreBridge 1180E/D offers a variety of ways to connect into a SAN. The following is a quick start description:

1 **Physically place the FibreBridge 1180E/D where you want it. (See Chapter 3)**

2 **Connect a SCSI device to the FibreBridge. (See Chapter 4)**

3 **Connect the FibreBridge to your SAN: attach short wave optical cables or MIA compliant DB-9 connectors into the Fibre Channel port on the FibreBridge. (See Chapter 5).**

4 **Connect to the management (services) port via the RS-232 serial port. (See Chapter 7)**

5 **Map your devices to the FibreBridge Fibre Channel port. (See Chapter 6 and Chapter 8.1.7)**

6 **Boot the computers on the SAN and configure these machines for the devices connected to the FibreBridge.**

Exhibit 2-1 The following chart provides an overview of the features and capabilities for the newest FibreBridge models. Contact your authorized ATTO representative or visit ATTO Technology's website, www.attotech.com, for additional information.

ATTO FibreBridge™ feature availability matrix

	1180E/D	1190E	2200R/D	2300E/R/D	3200R	3300R	4500E/R/D
FC Ports	1	1	1	1	1	1	3
FC port number (fp)	0	0	0	0	0	0	0, 1, 2
FC interface	DB9/SC	DB9	GBIC	SFP	GBIC	SFP	SC
Data transfer	1 Gigabit	1 Gigabit	1 Gigabit	2 Gigabit	1 Gigabit	2 Gigabit	1 Gigabit
SCSI ports	1	2	2	2	2	2	4
SCSI bus number (sb)	0	0, 1	0, 1	0, 1	0, 1	0, 1	0, 1, 2, 3
Maximum data transfer rate	80 MB/sec.	100 MB/sec.	100 MB/sec.	300 MB/sec.	100 MB/sec.	300 MB/sec.	300 MB/sec.
Configuration	Board Desktop	Board	Desktop Rackmount	Board Desktop Rackmount	Rackmount	Rackmount	Board Desktop Rackmount
Error checking & correction memory	✓	✓		✓		✓	✓
Serial management interface	✓	✓	✓	✓	✓	✓	✓
Management via Telnet/FTP		✓	✓	✓	✓	✓	✓
In-band SCSI management interface	✓	✓		✓		✓	✓
Menu interface	✓	✓	✓	✓	✓	✓	✓
BridgeTools management interface	✓	✓	✓	✓	✓	✓	✓
In-band CLI	✓	✓		✓		✓	✓
Serverless backup	✓	✓	✓	✓	✓	✓	✓

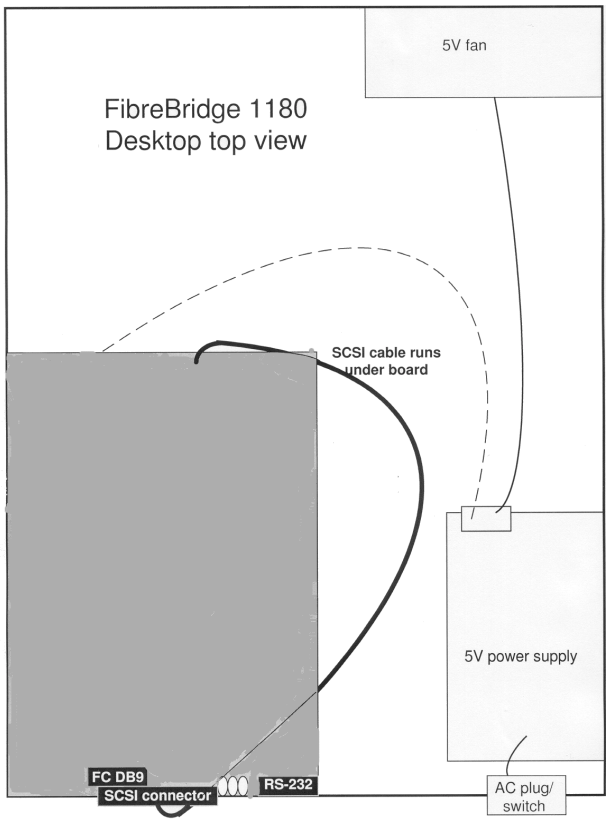
3 ATTO FibreBridge 1180E/D characteristics

The ATTO FibreBridge 1180E/D is a 1 by 1 (one Fibre Channel port with one SCSI port) Fibre Channel-to-SCSI bridge for standard applications available in vertical or horizontal interface in the embedded version or a desktop version. The bridge is designed for high throughput enterprise environments and mission-critical applications.

The form factor and low cost make the FibreBridge 1180E/D an attractive solution to convert SCSI devices to Fibre Channel and enable direct connection to Storage Area Networks (SANs).

- Serverless backup support for SNIA extended copy command
- Support for manual and auto LUN mapping
- Operating system independent

Exhibit 3-1 FibreBridge 1180D component schematic.



Dimensions

	Embedded board	Desktop
Length	5.59 in. (14.2 cm)	10 in. (24.4 cm)
Width	3.89 in. (9.9 cm)	7.5 in. (19.05 cm)
Height		2.03 in. (5.1 cm)

Cooling

Environmental requirements

- Temperature: 0-40^{o} C
- Ambient air should not exceed 40^{o}C.
- Humidity: 10-90% non-condensing

FibreBridge 1180D A fan draws air at 10 CFM from the back and sides of the unit and exhausts it out the front and through the unit's bottom panel.

Power

FibreBridge 1180E Power (+5VDC and +12VDC) is supplied to the through a 4-pin connector: Amp Part no: 641737-1. The 1180E is designed to have ±5% tolerance to the power supply. A switching regulator is used to generate the 3.3VDC from the 12VDC, requiring 0.75A at12VDC.

FibreBridge 1180D requires 3A@5VDC. An AC power connector and switch are located on the back of the unit.

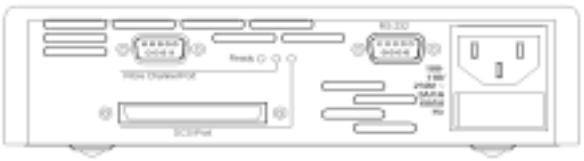
Fibre Channel port

The Fibre Channel port can connect the FibreBridge to either a Fabric or Arbitrated Loop.

- 1.0625 gigahertz (80 MB/sec.)
- Class 2 and Class 3 ANSI Fibre Channel specifications support
- PLDA, Public Loop Login (NL_port) and Fabric Direct Connect (N_port) support
- Full Duplex transmission support

➔ MIA compliant DB-9 or Short Wave fiber optic SE connector

Exhibit 3-2 FibreBridge 1180D back panel



SCSI port

The SCSI port on the FibreBridge 1180E/D connects storage devices into the Fibre Channel Storage Area Network (SAN) using an Ultra 2 (LVD) SCSI bus, downward compatible with all forms of single-ended SCSI.

Serial port

The RS-232 serial port provides support for remote monitoring and management through a command line interface, menu system or graphical interface (ATTO Technology BridgeTools).

Pin	Signal	
1	DCD	(Carrier Detect)
2	DSR	(Data Set Ready)
3	RX	(Receive Data)
4	RTS	(Request to send)
5	TX	(Transmit Data)
6	CTS	(Clear to Send)
7	NC	(No Connect)
8	NC	(No Connect)
9	GND	(Ground)
10	NC	(No Connect)

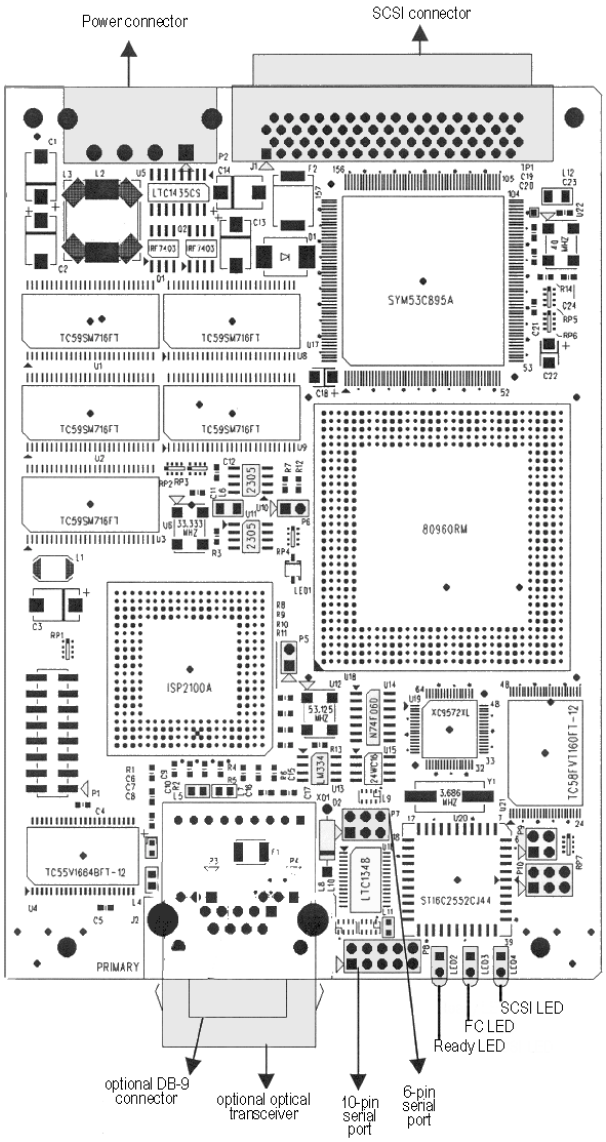
LED indicators

➔ FC Activity: LED blinks to show activity on the Fibre Channel port (numbered 0). During very high activity, the LED appears to be steadily lit.

➔ SCSI Activity: shows activity on the SCSI bus (numbered 0).

➔ Ready: should light after power has been applied; indicates the board has completed the initialization process without any failures and is ready to handle data transfer.

Exhibit 3-3 FibreBridge 1180E/D board layout.



4 How to connect SCSI devices to the SCSI port

ATTO FibreBridge SCSI ports connect SCSI storage devices into the Fibre Channel Storage Area Network (SAN).

The FibreBridge 1180E/D has an Ultra 2 (LVD) SCSI bus downward compatible with Single Ended Ultra SCSI as well as Fast, Wide, or Narrow SCSI devices.

The SCSI port can support 15 devices. The SCSI bus is capable of 40 or 80 MB/sec. (Ultra or Ultra2).

The SCSI bus auto-negotiates the appropriate sync rates with the connected devices. If slower devices are mixed with faster Ultra2 devices, the bus will communicate at the rate of the slowest device.

The FibreBridge supports a wide variety of SCSI storage devices including stand-alone drives, removable drives, JBODs, RAIDs, tape, CD and DVD drives, changers, libraries and magneto optical drives.

To connect SCSI devices to the ATTO FibreBridge:

1 **Connect a 68-pin P SCSI connector from the SCSI device to the SCSI port on the FibreBridge 1180E/D.**

Check the type of cable, cable length limit and number of devices recommended for each port. It is important to keep cable lengths as short as possible to ensure the highest signal quality and performance.These cable lengths include the wiring inside the devices.

Device type	Number of devices	Cable limit
Ultra SCSI Single Ended (SE)	less than 4	3 meters
Ultra SCSI Single Ended (SE)	4 or more	1.5 meters
Ultra2 SCSI Low Voltage Differential (LVD)	15	12 meters

Set the IDs of the SCSI devices connected to the bridge to a value other than 7. Use a sequential ID starting at 0 for each device. Each SCSI port in the ATTO FibreBridge has an internal factory setting ID of 7, typical for a SCSI initiator device.

NOTE The entire SCSI bus will operate at the speed of the slowest device.

2 **Terminate each SCSI bus after the last device. The bridge is terminated internally.**

5 How to connect the Fibre Channel port

The Fibre Channel port on the ATTO FibreBridge 1180E/D connects the bridge into either a Fabric or Arbitrated Loop.

Fibre Channel technology offers a variety of cabling options including standard copper, equalized copper, multimode fiber optic and single mode fiber optic.

The FibreBridge 1180E/D uses an MIA-compliant DB9 or an embedded SC fiber optic cable connector.

The type of cable to use varies depending upon the application, environment and distance. The following tables illustrate the different cable options available.

Make sure all cables are anchored securely at both ends with the proper connectors.

Cable length	Cable type	Cable size	Connector
<15 meters	unequalized copper		DB-9
≥ 15 meters ≤ 30 meters	equalized copper		DB-9
Up to 175 meters	multi mode fiber optic	62.5 micron	SC optic connector
Up to 500 meters	multi mode fiber optic	50 micron	SC optic connector

Initial configuration

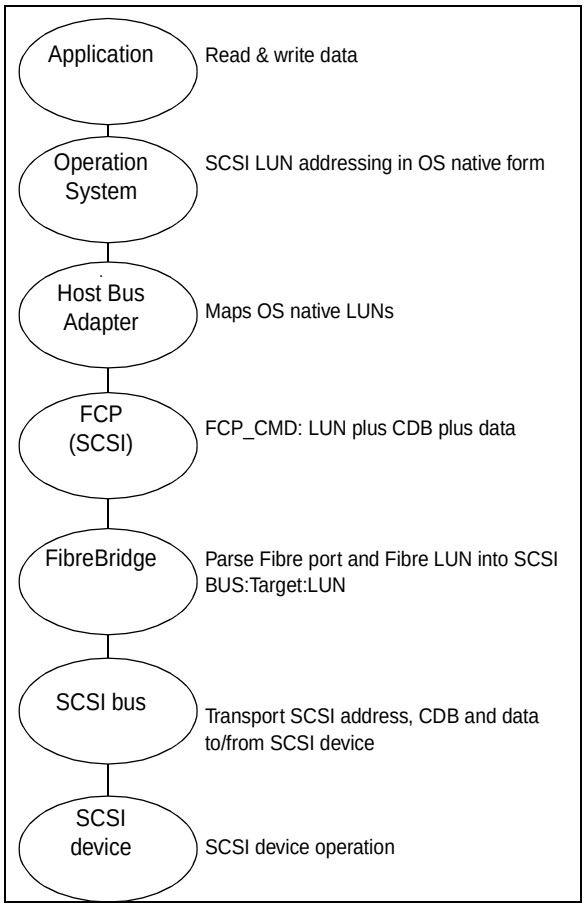
The FibreBridge can be configured to support connectivity to arbitrated loop or fabric topologies. (See Chapter 6.)

- When connecting the bridge to an F-Port device, set the Port Connection Mode to *Point-to-Point.*
- When connecting to a FL-port device, set the Port Connector Mode to *Loop* mode.
- The FibreBridge uses *Point-to-Point* login to log into an F-port on a fabric switch and public loop login to log into an FL-port on a fabric switch.
- The FibreBridge Port Connection Mode can be set using the RS-232 or in-band communication links.

6 ATTO FibreBridge addressing

The ATTO FibreBridge allows parallel SCSI devices to participate in a Fibre Channel arbitrated loop or on a fabric. Fibre Channel and parallel SCSI use different models to address devices. The FibreBridge translates between these addressing models.

The chart below is a simplified overview of data and control flow between the application and the SCSI device through a number of stages.



Fibre Channel World Wide Name (WWN)

Each Fibre Channel device is assigned a unique World Wide Name (WWN). The WWN is used to identify all Fibre Channel devices. The 64-bit WWN has the following format:

Field Name	WWN Format		Company ID			Device ID		
Byte	0	1	2	3	4	5	6	7
Value	20	00	00	10	86	xx	xx	xx

The Institute of Electrical and Electronics Engineers (IEEE) assigns each manufacturer a unique Company ID. The Device ID field contains a unique value assigned by ATTO Technology to every Fibre Channel product produced by ATTO Technology.

Arbitrated Loop Port Address (AL_PA)

On a Fibre Channel Arbitrated Loop, the FibreBridge appears at a single Arbitrated Loop Port Address (AL_PA). Each device on an arbitrated loop is assigned a unique AL_PA during loop initialization. The FibreBridge supports both modes of AL_PA assignment, commonly referred to as *hard* and *soft addressing*.

Soft addressing allows the loop initialization master to assign the FibreBridge a unique AL_PA during the loop initialization process. The AL_PA assigned cannot be determined before loop initialization. For example, adding new devices to an arbitrated loop may change the AL_PA assigned to the FibreBridge.

Hard addressing allows a predetermined AL_PA to be assigned to the FibreBridge. The FibreBridge will try to acquire the desired hard AL_PA. If another device has already been assigned the specified AL_PA, the FibreBridge will acquire a currently unassigned AL_PA.

ATTO BridgeTools software allows you to select either hard or soft addressing modes. The default mode is soft addressing.

Addressing Devices Connected to the FibreBridge

SCSI devices connected to the FibreBridge also show up as Fibre Channel LUNs to the host computer. SCSI devices must be on the same addressing level as the SCSI portion of the

FibreBridge. The FibreBridge SCSI ID must be set to a different SCSI ID from the other devices on the bus.

SCSI devices are mapped manually to desired Fibre Channel port and Fibre Channel LUNs. Manual mapping allows you to maximize the efficiency and performance of your SCSI devices while allowing great flexibility.

Manual SCSI Device Mapping

The FibreBridge can be commanded to find all the SCSI devices on its SCSI bus. With this information you then decide where you want to place these devices on the Fibre Channel ports.

In the chart at right, the SCSI device on SCSI bus 0 at SCSI address of ID 0 LUN 0 is being mapped to Fibre Port 0 (on the FibreBridge) at Fibre Channel LUN 4.

Note: two SCSI devices cannot be mapped to the same Fibre Port and Fibre Channel LUN. Also, if the same SCSI device is mapped to two different Fibre Port and/or Fibre Channel LUN, these Fibre Port and Fibre Channel LUNs will be taken offline automatically until the conflict is resolved.

You may map SCSI devices manually by using the Command Line Interface RouteXXX family of commands. See Chapter 8.1.7 for more details.

Fibre Port	FC LUN	SCSI BUS	SCSI ID	SCSI LUN
0	4	0	0	0
0	0	0	1	0
0	2	0	13	0
0	0	0	15	0
0	3	0	1	0
0	10	0	1	1
0	30	0	8	5
0	23	0	8	7

7 How to access ATTO FibreBridge Services

Communicate with the ATTO FibreBridge through an in-band Fibre Channel link using ATTO BridgeTools (a graphical interface configuration program) or in-band SCSI commands or through the RS-232 port or serial headers using ATTO BridgeTools, Command Line Interface or a menu.

ATTO FibreBridge Services can be used to configure and tune the bridge for many different environments and applications, update the firmware, configure the addresses of the connected SCSI devices, monitor internal power and temperature status, report on hardware diagnostics and log failures.

Access to FibreBridge services is either through in-band SCSI over Fibre Channel or the RS-232 port or serial header.

The next chapters of this manual provide details on using the Command Line Interface and menu system to access FibreBridge Services. Refer to the ATTO BridgeTools manual for complete instructions on how to use the program.

CAUTION Any changes must be saved and will not take effect until the ATTO FibreBridge is restarted.

Access the ATTO FibreBridge through in-band SCSI over Fibre Channel

One way to access the ATTO FibreBridge through in-band SCSI over Fibre Channel is to use ATTO BridgeTools, a Java-based graphical interface configuration utility, to flash firmware and manage configuration for many FibreBridge models. The program supports Windows® 98, NT, and 2000, Sun Solaris™ and Mac® OS 9.1 and earlier.

Refer to the ATTO BridgeTools manual for complete instructions to how to install and operate the program.

In-band SCSI commands (Write Buffer and Read Buffer) may be issued to the FibreBridge to manage configuration via two mechanisms:

- In-band CLI over SCSI, where ASCII CLI (services) commands, may be issued via Write Buffer. All CLI commands are supported. Refer to Chapter 9.4.
- Buffer ID/value, where the application program uses a SCSI CDB (command descriptor block) to select the buffer ID of the configuration parameters to be affected, and the new value of the parameter. Most FibreBridge configuration options are available.

Access the ATTO FibreBridge over the RS-232 port

The ATTO FibreBridge supports remote service operations over the RS-232 serial port or serial header using standard terminal emulation software available with most systems.

1. **Connect a DB-9 crossover serial cable (null modem) between the ATTO FibreBridge serial port or serial header and one of the computer's serial COM ports. A gender changer or DB-9 to DB-25 converter may be needed depending on the cables being used.**
2. **Enable the computer's serial port and initiate a terminal emulation link.**
3. **Set the following serial parameters in your terminal program: Bits per second: 9600, Data Bits: 8, Parity: None, Stop Bits: 1, Flow Control: None. Use ASCII as the terminal type. Echo should be on.**
4. **Power up the FibreBridge.**
5. **You may use a graphical interface (BridgeTools), command line interface (CLI) or menu system as explained in the rest of this manual.**

8 How to use ATTO FibreBridge Services

Configuration of the ATTO FibreBridge, also known as FibreBridge Services,' is available via ATTO BridgeTools (a graphical user interface configuration manager), Command Line Interface (CLI) or a menu.

FibreBridge Services includes displaying and modifying various attributes of FibreBridge operation, as well as the update of firmware. You may use a graphical interface (BridgeTools), command line interface (CLI) or menu system, depending on your FibreBridge model, what you want to accomplish, and the method you are using to access FibreBridge services.

ATTO BridgeTools

The simplest way to communicate with the bridge is to use BridgeTools, a Java-based graphical interface configuration utility designed to flash firmware and manage the configuration for all models of the FibreBridge.

The BridgeTools program currently supports Sun Solaris, Windows 95/98, NT, and 2000 and MAC OS 9.1 and earlier.

BridgeTools detects which FibreBridge model is available and presents you with the applicable configuration options. At the startup, a screen will present choices to communicate with the FibreBridge. You can choose between an in-band connection direct over the Fibre Channel link, an RS-232 port or an Ethernet port.

A tabbed panel interface presents configuration parameters in a simple, one-window display. Message boxes, icons, drop-down boxes, menu bars and other common graphical constructs lead you through the configuration process.

Refer to the ATTO BridgeTools Manual for complete instructions to how to install and operate the program.

Command Line Interface (CLI)

The Command Line Interface provides access to FibreBridge Services through ASCII command lines. CLI is designed to be used by applications such as BridgeTools and “power users.” The initial display, after powering up the unit or restarting the firmware, will contain the information in Appendix A. Once the initial display is complete, with the word *Ready*, you are in the Command Line Interface mode.

Type *Help* to display a list of all commands available.

Menu mode

The Menu contains most commands available through CLI but in a hierarchal format. It follows a standard menu/choice model.

The initial display, after powering up the unit or restarting the firmware, will contain the information in Appendix A. Once the initial display is complete, with the word *Ready*, you are in the Command Line Interface mode.

Type *Menu* and you will enter the menu system.

8.1 Command line use and guidance

Configuration of the ATTO FibreBridge, also known as FibreBridge Services, is available via the Command Line Interface (CLI)

FibreBridge Services includes displaying and modifying various attributes of FibreBridge operation, as well as the update of firmware using the command line interface (CLI).

The Command LIne Interface provides access to FibreBridge Services through ASCII command lines. CLI is designed to be used by applications and "power users."

The initial display, after powering up the unit or restarting firmware, will contain the information in Exhibit A. Once the initial display is complete, with the *Ready,* you are in the Command Line Interface mode.

Type *Help* to disaply a list of all commands available.

- CLI commands are context sensitive and generally follow a standard format:

[Get | Set] Command [Parameter 1 | Parameter 2] followed by the *return* or *enter* key

- CLI commands are case insensitive: you may type all upper or all lower case or a mixture. Upper and lower case in this manual and the *help* screen are for clarification only.
- Commands generally have three types of operation: get, set and immediate. They are summarized here and in Exhibit 8.1-1
  - The **get** form returns the value of a parameter or setting and is an informational command.

Responses to get commands are specified in the ***Results*** field for each command, followed by *Ready.*

  - The **set** form is an action that changes the value of a parameter or configuration setting. It may require a **SaveConfiguration** command and a restart of the system before it is implemented. The restart can be accomplished as part of the **SaveConfiguration** command or by using a separate **FirmwareRestart** command. A number of set commands may be issued before the **SaveConfiguration** command.

Responses to **set** commands are either an error message or *Ready. **.* The asterisk indicates you must use a **SaveConfiguration** command to finalize the **set** command. **SaveConfiguration** will ask whether you want to restart the system or not.

  - Set commands which do not require a **SaveConfiguration** command, defined as immediate commands, are immediately executed.

Responses to Immediate commands are either an error message or data results followed by *Ready.*

- Symbols, typefaces and abbreviations used to indicate functions and elements of the command line interface used in this manual are in Exhibit 8.1-2.

Exhibit 8.1-1 Command explanations.

Set commands configure the FibreBridge and display what you have changed after completing the task. Commands which require a **SaveConfiguration** command to complete their implementation will return *Ready. **.* Set commands which do not require a **SaveConfiguration** command are immediately executed.
Get commands display information about the configuration of the FibreBridge. Responses to get commands are specified in the Results field for each command, followed by *Ready.*
Screen messages, also called returns, may be either terse, with just the current information, or verbose, with labels and the current information.

Exhibit 8.1-2 Command conventions

Symbol	Indicates
[ ]	Required entry
< >	Optional entry
|	pick one of
…	Ellipses, repetition of preceding item
\n	end of line
-	a range (6 – 9 = 6, 7, 8, 9)
Boldface words	must be typed as they appear
Italicized words	Arguments which must be replaced by whatever they represent
fl	Fibre Channel lun number (0 <= fl <= 31)
fp	Fibre Channel port number (0 ✣† fp <= 2)
sb	SCSI bus number (0<= sb <= 3)
sl	SCSI lun ID (0 <= sl <= 7)
st	SCSI target ID (0 <= st <= 15)

8.1.1 General information commands

The CLI commands outlined in this chapter get information which are used in a variety of situations with the FibreBridge.

FibreBridgeModel

Reports model information about a specific FibreBridge

Action: **none**

Information: **get FibreBridgeModel**

Returns:
FibreBridge 1180
©2001 ATTO Technology, Incorporated
Firmware version mm..mm release date mm.dd.yyyy, hh:mm:ss
Build zzzz

FibreBridgeName

Specifies the eight-character name assigned to the FibreBridge used to identify individual FibreBridge units. It is not the World Wide Name (WWN).

Actions: **set FibreBridge Name [value]**

Information: **get FibreBridgeName**

SaveConfiguration

Help

Displays a list of available commands. If command name is specified, displays detailed command-specific information.

Action: **none**

Information: **Help [command name]**

Info

Displays version numbers and other production information for key components within the FibreBridge

Action: **none**

Information: **Info**
Return:
Device = “FibreBridge 1180”
Serial Number = PPPnnnnnn
Device Version = xxxx
Device Build = xxxx
Build Date = Month Day Year ‘Build Time’
NVRAM Revision = xx
CLI Revision = x.xx
FC Firmware Revision = x.xx.xx
FibreBridge name = xxxxxxxxxx
World Wide Name 0 = xx xx xx
SCSI Port 0 = “[SE | HVD | LVD | UNKNOWN]”

SerialNumber

Reports the FibreBridge serial number which is unique for each FibreBridge. The serial number tracks the board throughout its life and should not be changed for any reason.

Actions: **none**

Information: **get SerialNumber**

Verbose return:
Part Identifier: PPPPPPP Sequence Number: nnnnnn

VerboseMode

Specifies the detail of feedback for the command line interface. Disabling this option removes parameter names from action commands and removes descriptions from information commands.

Limits: enabled or disabled

Default: enabled (returns have parameter information)

Actions: **set VerboseMode [enabled | disabled]**

Information: **get VerboseMode**

8.1.2 Maintenance commands

The CLI commands outlined in this chapter may be used to get information or perform functions which are used in a variety of situations with the ATTO FibreBridge.

FirmwareRestart

Causes the FibreBridge to reboot, then re-initialize its firmware.

Actions: **FirmwareRestart** Information: **none**

Reserve

Reservation of the FibreBridge is implicit: once the configuration image is changed by any user of services, the FibreBridge becomes RESERVED. Executing a SaveConfiguration, RestoreConfiguration or FcRestart RELEASES the FibreBridge so that other services users may access it.

Limits: When FibreBridge services interface is RESERVED, set commands from other users are unavailable.
At least one interface must always have access to the FibreBridge.

Action: **Reserve** Information: **none**

Return: [enabled | disabled]

RestoreConfiguration

Restores configuration to either the default configuration or the configuration last saved into non-volatile memory. The saved option will undo any changes made since the last save.

Actions: **RestoreConfiguration [Default | Saved]** Information: **none**

SaveConfiguration

Many commands require a SaveConfiguration command to be executed indicated by the return Ready. *. When you invoke SaveConfiguration, the current configuration is permanently saved in the FibreBridge and the new configuration becomes the active configuration. If a firmware restart is required to make the requested change permanent, you will see a prompt asking you to confirm the restart. You can override this request by indicating the override value on the command line. You may make several changes through commands and SaveConfiguration before implementing the restart, but once you have restarted the FibreBridge, all the command changes created before the restart and save will be implemented. If you select the restart option, the FibreBridge will execute its complete start up cycle.*

Limits: Restart or no Restart parameter is optional

Actions: **SaveConfiguration <Restart| NoRestart>** Information: **none**

Returns: [Configuration saved |
Restart is necessary...
Do you wish to restart (y/n)? y
Restarting...]

Zmodem

Allows transfer of a firmware image to or from the FibreBridge using the ZMODEM file transfer protocol.

Limits: available only through the RS232 interface

WARNING After a firmware image is downloaded to the FibreBridge, the image is placed into flash memory. During this time (about 30 seconds), DO NOT remove power to the FibreBridge or the host until the READY **message is displayed. The flash may become corrupted if you remove power prematurely.**

Actions: **Zmodem [Send filename | Receive]** Information: **none**

SaveConfiguration

Returns: *Z*MODEM transfer complete on success
ERROR with status message on failure

8.1.3 Diagnostic commands

ATTO FibreBridge diagnostic commands help validate FibreBridge operation and diagnose/isolate FibreBridge faults.

Event logging is a mechanism for on-site observation of internal FibreBridge behavior such as tracing SCSI commands received over the Fibre Channel from the host and return of data and status to the host.

CLI commands are case insensitive (upper and lower case allowed anywhere).
Commands generally follow a standard format:
[Get | Set] Command [Parameter 1 | Parameter 2] followed by the return or enter key

ClearEvent

Clears the contents of the event log.

Actions: **ClearEvent**

Information: **none**

DispEvent

Sets the switches which control the filtering performed when displaying events.

Limits: To display from several different subsystems or events, use a mask value equal to the logical OR of the corresponding values. To display events from all subsystems, enter [0x3F] as the mask

Default: [0x7F] 0x3F] [all]

[subsystem] controls which subsystem's events display
0x01 FCP Processor/i960 Interaction
0x02 SCSI Processor/i960 Interaction
0x04 Ethernet
0x08 Extended copy
0x20 NVARM & Flash
0x40 ECC failures

[event_level] controls what report level events display
0x01 Info: general information
0x02 Warning: unexpected situation/condition
0x04 Critical: operation limited/curtailed
0x08 Failure: hard failure
0x10:Other
0x20 Debug: ATTO tracking events

[status] [all]: all events regardless of status values
[ngood]: only events with a status value other than good

Actions: **set DispEvent [subsystem] [event_level] [status]**

Information: **getDispEvent**
Verbose return: DispEvent=SubSys:0xXX Lv1:0xXX
Status: [all | no good]

SaveConfiguration

DisplayEvent

Results in a display of the current contents of the event log to the display. The log is filtered by the current switch settings as described in the DispEvent command. If the optional all *parameter is provided, the display filtering is temporarily suspended and all logged events are displayed regardless of the current event filter switch settings.*

Actions: **DisplayEvent <all>**

Information: **none**

EccLog

ECCLog contains the Error Correcting Code statistics since the previous statistics were last cleared. The maximum number of errors is 65535. Get form shows the statistics. The set form sets the statistics to zero.

Actions: **set EccLog clear**

Returns: Ecc Logs cleared

Information: **get EccLog**

Returns: ECC Errors:
Single-bit 0xnnnn
Multi-bit 0xnnnn
POST Single-bit 0xnnnn
POST Multi-bit 0xnnnn
Last Error Address 0xyyyyyyyy

ErrorLog

Set form clears ErrorLog since previous error reported. Get form shows error messages since the report was last cleared.

Limits: Error type may be returned as [960 | Static Memory | Synchronous DRAM | ISP2200 | FibreChannel | Software] and one line of descriptive text]

Actions: **set ErrorLog clear**	Information: **get ErrorLog**
Returns: Error Logs cleared	Returns: The last error code save was xx [An error of type xxx was detected since last error log clearing Specific error text.]

IdentifyFibreBridge

Enabling this option causes the Ready LED on the front panel of the FibreBridge to blink until the parameter is disabled.

Actions: **set IdentifyFibreBridge [enabled|disabled]**	Information: **get IdentifyFibreBridge**

SaveConfiguration

LogEvent

Sets the switches which control the filtering performed when logging events.

Limits: To display from several different subsystems or events, use a mask value equal to the logical OR of the corresponding values. To display events from all subsystems, enter [0x7F] as the mask	Default: [disabled]
[subsystem] controls which subsystem's events display 0x01 FCP Processor/i960 Interaction 0x02 SCSCI Processor/i960 Interaction 0x04 Ethernet 0x08 Extended copy 0x20 NVARM & Flash 0x40 ECC failures	[event_level] controls what report level events display 0x01 Info: general information 0x02 Warning: unexpected situation/condition 0x04 Critical: operation limited/curtailed 0x08 Failure: hard failure 0x10 Other; 0x20 Debug: track events
[status] [all]: all events regardless of status values [ngood]: only events with a status value other than good	
Actions: **set LogEvent [enabled | disabled] | [[subsystem] [event_level] [status]]**	Information: **getLogEvent**
SaveConfiguration	

ParityLog

Contains the parity error statistics for the FibreBridge since the statistics were last cleared. The set form sets the statistics to zero.

Limits: 65,535 maximum number of errors

Action: **set ParityLog clear**	Information: **get ParityLog**
SaveConfiguration	Returns: Parity Errors: FibreChannel 0xnnn SCSI 0xnnn

Performance

Returns the performance data for the Fibre Channel port you specify. Data includes the average rate (MBs per sec.) and number of I/Os measured over the previous sampling period where a sampling period is approximately one second. Requesting performance data for a FC port which has been disabled or has failed will result in the display of an error message ("ERROR Disabled Fibre Channel port" or "ERROR Failed Fibre Channel port"). Reported performance may be affected by FC port and SCSI bus availability and saturation, SCSI device speeds and overall system use.

Limits: Successful SCSI Read (08h, 28h) and Write (0Ah, 2Ah) commands are considered I/Os.
Valid FC port (fp) entry is [0] for the FibreBridge 1180

Actions: **none**	Information: **get Performance <fp>**
	Verbose return: [line count] ; fp MB/s IO/s [fp] [mmm.mmm] [nnn]

8.1.4 Fibre Channel configuration commands

The Fibre Channel ports are configured with default settings but may be customized using the CLI commands in this section.

DispFcPortDB

Used to display the contents of the specified FC port's internal port database which contains Fibre Channel addressing information for each FC target device visible to the FibreBridge.

Action: **none**

Information: **DispFcPortDB <fp>**

Returns: Node name, 24-bit port ID, 8-bit internal loop ID of each FC device

FcAck0

Specifies whether ACK0 or ACK1 will be returned in response to a Class 2 FC data frame or sequence.

Limits: Enable sends ACK0 at the end of a sequence. Disable returns an ACK1 frame for each data frame.

Action: **set FcAck0 [enabled | disabled]**

Information: **get FcAck0**

SaveConfiguration

Returns: [fp] [fl] [sb] [st] [sl] [Online|Offline]

FcClass2

Specifies if the FibreBridge will support Fibre Channel Class 2 (multiplexed) service. The FibreBridge uses Class 3 service by default.

Limits: [enabled | disabled]

Default: Class 3 **(DISABLED?)**

Action: **set FcClass2 [enabled | disabled]**

Information: **get FcClass2**

SaveConfiguration

FcConnMode

Controls/reports the connection mode the FibreBridge uses when communication across a Fibre Channel network, either to an arbitrated loop (FC-AL) when you select loop *mode, or point-to-point when you choose* ptp.

Limits: applies to all Fibre Channel ports

Default: loop

Actions: **set FcConnMode [loop | ptp]**

Information: **get FcConnMode**

SaveConfiguration

FcFairArb

Turns the Fibre Channel Arbitrated Loop (FC-AL) arbitration fairness on or off. When enabled, the FibreBridge follows the arbitration fairness rules on the FC-AL.

Limits: applies to all Fibre Channel ports

Default: on, enabling arbitration fairness

Actions: **setFcFairArb [enabled | disabled]**

Information: **getFcFairArb**

SaveConfiguration

FcFullDuplex

When enabled, allows full duplex Fibre Channel communication between the FibreBridge and other Fibre Channel devices. Disable FcFullDuplex results in half duplex mode.

Limits: applies to all Fibre Channel ports

Default: enabled

Actions: **setFcFullDuplex [enabled | disabled]**

Information: **get FcFullDuplex**

SaveConfiguration

FcHard

Used to enable or disable Fibre Channel hard address assignment. Under soft addressing, the FibreBridge loop address is assigned during loop initialization. Use FcHardAddress *(described below) if you enable hard addressing.*

Limits: applies to all Fibre Channel ports

Default: enabled, or hard addressing

Actions: **setFcHard [enabled | disabled]**

Information: **get FcHard**

SaveConfiguration

FcHardAddress

Sets/displays the value used as the FC-AL hard address. This hexadecimal value represents the address the FibreBridge will try to use if hard addressing is enabled. When an optional address is not present, the current value is displayed.

Default: 0 < = hard id < = 0x7d

Actions: **set FcHard Address [fp |[address]]**

Information: **get FcHardAddress [fp]**

SaveConfiguration

verbose return: Port n FcHardAddress = 0x01

FcInitiator

Allows FibreBridge to operate as an initiator on the Fibre Channel network, an attribute required for features such as Extended Copy.

Actions: **set FcInitiator [enabled | disabled]**
SaveConfiguration

Information: **get FcInitiator**

FcPortList

Returns a list of available Fibre Channel ports and their current status. Valid status values are OK *and* Failed.

Actions: **none**

Information: **FcPortList**
Returns: [line count] [fp] [status]

FcSCSIBusyStatus

Specifies the SCSI status value returned when the FibreBridge is unable to accept a SCSI command because of a temporary lack of resources.

Limits: [busy | qfull]
Default: busy

Actions: **set FcSCSIBusyStatus [busy | qfull]**
SaveConfiguration

Information: **get FcSCSIBusyStatus**

FcTargets

Obtains information about every Fibre Channel target device visible to a FibreBridge operating in initiator mode; devices may be used as targets for initiator mode features such as Extended Copy.

Actions: **none**

Information: **FcTargets**
Returns: Node Name, FC LUN & inquiry data for each FC device found

FcWWName

Reports the Word Wide Name (WWN) of the Fibre Channel interface. Each FC port has an individual and unique WWN. The least significant 6 bits of the WWN are used as the Ethernet MAC address.

Limits: Fabric and loop operations are unpredictable if duplicate WWNs are assigned.

Actions: **none**

Information: **get FcWWN [PortNumber]**
Return: Port n FcWWName= 20 00 00 10 86 nn nn nn

FibreBridgeTargetLUN

Specifies the soft target LUN(s) to be used by the FibreBridge when addressed by the host as a SCSI device.

Limits: Any map coinciding with the user-specified FBTarget LUN must first be set to *offline* before trying to change it. This map will be destroyed upon power-cycling the FB. Disabling a FibreBridgeTargetLUN for a particular FC port will destroy the map to the FB1180 for that port. The get form reports all FB Target LUNs currently NOT disabled. Specifying a port returns the status of that port.

Action: **set FibreBridgeTargetLUN [fp] [fl] | [disabled]]**
SaveConfiguration

Information: **get FibreBRidgeTargetLUN [fp]**
Returns:
[Line Count]
[fp] [fl]

Performance

Returns the performance data for the Fibre Channel port you specify. Data includes the average rate (MBs per sec.) and number of I/Os measured over the previous sampling period. Requesting performance data for a FC port which has been disabled or has failed displays an error message. Reported performance may be affected by FC port and SCSI bus availability and saturation, SCSI device speeds and overall system use.

Action: **none**

Information: **get Performance [fp]**
Return: [linecount]
; fp MB/s IO/s
[fp] [mmmm.mmmm] [nnn]

ServicesLUN

Sets and displays the Services LUN for the specified Fibre Channel port. Valid ServicesLUN entries are 0 through (n-1) where n equals the number of Fibre Channel ports. Valid entries for fl are 0-64. Any map coinciding with a user-specified ServicesLUN must be set to offline *before trying to change a ServicesLUN.*

Action: **set ServicesLUN [fp] [fl] | [disabled]]**
SaveConfiguration

Information: **get ServicesLUN [fp]**
Returns:
[Line Count]
[fp] [fl]

8.1.5 SCSI configuration commands

The SCSI ports are configured with default settings but may be customized to your specifications using the CLI commands in this section.

CLI commands are case insensitive (upper and lower case allowed anywhere).

Commands generally follow a standard format:

[Get | Set] Command [Parameter 1 | Parameter 2] followed by the return or enter key

ScsiInitID

Specifies the SCSI initiator ID to be used on the specified SCSI port as found in NVRAM. All maps coinciding with the user-specified ScsiInitID must be set to offline *and will become invalid upon issuing this command*

Limits: [0-15] wide [0-7] narrow

Action: **set ScsiInitID [sb [0-15]]**

Information: **get ScsiInitID**

SaveConfiguration

ScsiPortBusSpeed

Controls the transfer rate at which the FibreBridge will attempt to negotiate with its SCSI devices.

Limits: Fast SCSI, Ultra SCSI, Ultra 2 SCSI (valid only if FibreBridge has LVD-capable SCSI ports)

Default:

Actions: **set ScsiPortBusSpeed [Port Number [fast| ultra| ultra2]**

Information: **get ScsiPortBusSpeed**

SaveConfiguration

ScsiPortList

Returns a list of available SCSI ports and their current status

Limits: valid status values are OK and Failed

Action: **none**

Information: **ScsiPortList**

ScsiPortResetOnStartup

Specifies whether the SCSI port should be reset on power-up or not

Limits: Enabled resets each SCSI bus on restart

Default: enabled

Action: **set ScsiPortResetOnStartup [sb [enabled | disabled]]**

Information: **get ScsiPortResetOnStartup [sb]**

SaveConfiguration

ScsiPortSelTimeout

Indicates the time, in milliseconds, that the bridge waits for a response from a SCSI device on the selected port after a selection request. Setting a long selection time-out value can result in the host generating system time-out.

Limits: [256| 128|64|32|16|8|4|2|1]

Default: 64milliseconds

Action: **set ScsiPortSelTimeout [sb [256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1]]**

Information: **get ScsiPortSelTimeout [sb]**

SaveConfiguration

ScsiPortSyncTransfer

Specifies whether synchronous SCSI transfers should be negotiated with devices on the specified SCSI port.

Limits: [enabled | disabled]

Default: enabled

Action: **set ScsiPortSyncTransfer [[sb [enabled | disabled]]**

Information: **get ScsiPortSyncTransfer [sb]**

SaveConfiguration

ScsiPortTaggedQueuing

Specifies whether tagged command queuing is allowed on the SCSI port.

Limits: Enabled allows tagged commands for maximum performance

Default: enabled

Action: **set ScsiTaggedQueuing [sb [enabled|disabled]]**

Information: **get ScsiTaggedQueuing [sb]**

SaveConfiguration

ScsiPortWideTransfer

Specifies whether wide SCSI transfers should be negotiated.

Limits: enabled allows wide transfer negotiation

Default: enabled

Action: **set ScsiPortWideTransfer [sb[enabled|disabled]]**

Information: **get ScsiPortWideTransfer [sb]**

SaveConfiguration

ScsiTargets

Returns a list of SCSI devices operational on the referenced SCSI port. Also updates the status of any 'online' maps/routes to 'unavailable' if a device is not found or 'online' if a device is found.

Action: **none**

Information: **ScsiTargets [sb]**

Returns: [line count]
[sb] [st] [sl] [device type] [vendor ID] [product ID] [revision] [serial number]

ScsiTermination

Configures/reports the SCSI internal termination of the SCSI port identified.

Default: enabled

Action: **set ScsiTermination [sb [enabled | disabled]]**

Information: **get ScsiTermination [sb]**

SaveConfiguration

SpeedWrite

When enabled, improves the performance of FCP WRITE commands to SCSI devices attached to the FibreBridge.

Limits: Specify SCSI bus (sb), target (st), LUN (sl) of a mapped SCSI device or (all) for each currently mapped device

Action: **set SpeedWrite [sb st sl|all] [enabled|disabled]**

Information: **get SpeedWrite [sb st sl|all]**

SpeedWriteDefault

When enabled, SpeedWrite performance enhancement is set as the default for any subsequent SCSI devices mapped manually or via an AutoMap operation. If disabled, the FibreBridge will not attempt SpeedWrite performance enhancement to newly-mapped SCSI devices.

Action: **set SpeedWriteDefault [enabled | disabled]**

Information: **get SpeedWriteDefault**

8.1.6 Serial port configuration commands

The ATTO FibreBridge serial ports are configured with default settings but may be customized to your specifications using the CLI commands in this section.

CLI commands are case insensitive (lower case allowed anywhere).

Commands generally follow a standard format:

[Get | Set] Command [Parameter 1 | Parameter 2] followed by the return or enter key

SerialPortBaudRate

Configures/reports the baud rate for the FibreBridge RS-232 serial port. The number of data bits per character is fixed at 8 with no parity.

Limits: 2400, 9600, 19200, 38400, 57600, 115200

Default: 9600

Actions: **set SerialPortBaudRate [2400 | 9600 |19200 | 38400 | 57600 |115200]**

Information: **get SerialPortBaudRate**

SaveConfiguration

SerialPortEcho

Enables/disables/reports the echoing of keyboard input. When enabled, all non-control character keyboard input is output to the display.

Limits: Local ASCII terminal (or terminal emulator) echo settings should be set to disabled while using SerialPortEcho enabled

Default: disabled

Actions: **setSerialPortEcho [enabled | disabled]**

Information: **get SerialPortEcho**

SaveConfiguration Restart

SerialPortHandshake

Configures/reports the data handshaking method used to control the flow between the transmitter and receiver using hardware flow control, software flow control (Xon/Xoff)or no flow control.

Limits: hard (hardware flow control), xon (software flow control) or no flow control (none)

Default: no flow control (none)

Actions: **set SerialPortHandshake [hard | xon | none]**

Information: **getSerialPortHandshake**

SaveConfiguration

SerialPortStopBits

Configures/reports the number of stop bits per character for the FibreBridge RS -232 serial port. The number of data bits per character is fixed at 8 with no parity.

Limits: 1 or 2

Default: 1 stop bit

Actions: **set SerialPortStopBits [1 | 2]**

Information: **get SerialPortStopBits**

SaveConfiguration

8.1.7 Mapping commands

Access to SCSI devices is via Fibre Port and Fibre LUN addresses mapped to SCSI bus, target and LUNs. CLI commands are used to modify the mapping. See Appendix A for samples of the RouteXxxxx command interaction showing actual commands and their output to the Services port.

The RouteXxxxx and AutoMap commands provide the mechanism to map Fibre Channel Port/LUN to SCSI bus/target/LUN. Host applications use the Fibre Port and Fibre LUN to access specific SCSI devices.

AutoMap establishes a default mapping of Fibre ports and Fibre LUNs, and the RouteXxxxx commands manage the mapping, including display of current mapping and modification.

RouteDisplay displays the current mapping, in Fibre port, Fibre LUN order, showing the mapped SCSI bus/target/LUN, and the current status of the device (online, offline, unavailable, going offline). RouteDisplay may be used at any time.

RouteOffline, RouteChange, and RouteOnline modify the mapping as required (e.g. to make a device inaccessible, to replace a non-functioning mapped unit with another, to manage wear on tape drives).

Before modifying a map, set it *offline* via the RouteOffline command. This process notifies the FibreBridge to stop accepting SCSI commands (e.g. data transfers, inquiry, etc.) for the mapped device.

The RouteOffline command takes effect in two stages:

1. The device is marked *Going Offline*, indicating the FibreBridge will complete any current SCSI commands for the mapped device, and will reject any subsequent SCSI commands for that device.
2. When all current SCSI commands for the device are complete, the device status transitions to *Offline*, and the FibreBridge rejects any subsequent SCSI commands for that device.

After the device is *Offline* (verify this with the RouteDisplay command), use the RouteChange command to change its mapping. Use the RouteDisplay command to review the changes before setting the affected devices online.

When all changes are complete and correct, use the RouteOnline command to set the affected devices online. It is not necessary to set all mapped devices online: SCSI commands sent to offline devices are rejected.

Appendix A shows the sequence of AutoMap and RouteXxxxx commands.

AutoMap

Automatically maps all currently operational SCSI devices attached to the FibreBridge and distributes the devices among optional, user-specified FibreChannel ports.

Limits: Automapping skips unavailable (offline or failed) Fibre Channel and SCSI ports.

Actions:

AutoMap Distributes devices across all FC ports
AutoMap fp Distributes devices across fp

DispFcPortDB

Used to display the contents of the specified FC port's internal port database which contains Fibre Channel addressing information for each FC target device visible to the FibreBridge.

Action: **none**

Information: **DispFcPortDB <fp>**

Returns: Node name, 24-bit port ID, 8-bit internal loop ID of each FC device

FcHard

Used to enable or disable Fibre Channel hard address assignment. Under soft addressing, the FibreBridge loop address is assigned during loop initialization. Use FcHardAddress *(described below) if you enable hard addressing.*

Limits: applies to all Fibre Channel ports

Default: enabled, or hard addressing

Actions: **setFcHard [enabled | disabled]**

Information: **get FcHard**

SaveConfiguration

FcHardAddress

Sets/displays the value used as the FC-AL hard address. This hexadecimal value represents the address the FibreBridge will try to use if hard addressing is enabled. When an optional address is not present, the current value is displayed.

Default: 0 < = hard id < = 0x7d

Actions: **set FcHard Address [fp |[address]]**

Information: **get FcHardAddress [fp]**

SaveConfiguration

verbose return: Port n FcHardAddress = 0x01

FibreBridgeTargetLUN

Specifies the soft target LUN taken from NVRAM to be used by the FibreBridge when addressed by the host as a SCSI device.

Limits: Any map coinciding with the user-specified FibreBridgeTarget LUN must first be set to offline before trying to change it. This map will be unavailable upon power-cycling the FibreBridge.
The get form reports all FibreBridgeTargetLUNs currently NOT disabled. Specifying a port returns the status of that port.

Action: **set FibreBridgeTargetLUN [fp] [fl] | [disabled]]**

Information: **get FibreBRidgeTargetLUN <[fp]>**

SaveConfiguration

Returns:
[Line Count]
[fp] [fl]

RouteChange

Maps a Fibre Channel port and LUN to a SCSI bus, target and LUN.

Limits: Attempts to map to a SCSI device currently online results in an error message
Valid entries: fp (0), fl (0-31), sb (0), st (0-15), sl (0-7)

Action: **RouteChange [fp] [fl] [sb] [st] [sl]**

Information: none

RouteDisplay

Returns a list of currently mapped Fibre Channel-to-SCSI routes sorted by Fibre Channel address and assembled according to the optional parameters specified. Each list is preceded by a count of the lines that immediately follow.

Valid status values
Online: able to accept SCSI commands
Unavailable: no device currently assigned to a particular route; SCSI commands will time-out
Offline: rejects any SCSI command
Going Offline: RouteOffline has been issued, but queued commands are underway; becomes Offline when all queued commands are complete; new SCSI commands sent to a going offline device are rejected

Action: **none**

Information:
RouteDisplay Displays all current maps
RouteDisplay [fp] Displays specified FC port maps
RouteDisplay [online|offine] Displays all maps with route status [online|offline]
RouteDisplay [fp [fl]] Displays the current map of fp & fl
RouteDisplay [fp [online|offline]] Displays all maps for a given FC port with route status [online|offline]

Returns:
[line count]
[fp] [fl] [sb] [st] [sl] [Online|Offline]

RouteOffline

Sets a route to offline or reports its status as offline

Action: **set RouteOffline [fp] [fl]**

Information: **get RouteOffline [fp] [fl]**

Returns: [fp] [fl] [sb] [st] [sl] [Going offline|Offline]

RouteOnline

Updates the status of the selected route to 'online' if a device is found or 'unavailable' if a device is not found at the SCSI address.

Limits: if route is not currently mapped, command results in an error message

Action: **set RouteOnline [fp] [fl]**

Information: **get RouteOnline [fp] [fl]**

Returns: [fp] [fl] [sb] [st] [sl] [Online|Offline]

Returns:
[line count]
[fp] [fl] [sb] [st] [sl] [Online|Offline]

ScsiTargets

Returns a list of SCSI devices operational on the referenced SCSI port. Also updates the status of any 'online' maps/routes to 'unavailable' if a device is not found or 'online' if a device is found.

Action: **none**

Information: **ScsiTargets [sb]**

Returns: [line count]
[sb] [st] [sl] [device type] [vendor ID] [product ID] [revision] [serial number]

ServicesLUN

Sets and displays the Services LUN for the specified Fibre Channel port. Valid ServicesLUN entries are 0 through (n-1) where n equals the number of Fibre Channel ports. Valid entries for fl are 0-64. Any map coinciding with a user-specified ServicesLUN must be set to offline *before trying to change a ServicesLUN.*

Action: **set ServicesLUN [fp] [fl] | [disabled]]**

Information: **get ServicesLUN [fp]**

SaveConfiguration

Returns:
[Line Count]
[fp] [fl]

8.1.8 Serverless backup commands

Serverless Backup is an application that allows data to be copied between two storage devices (Fibre Channel disks, SCSI disks and SCSI tapes) with minimal intervention from a server.

Serverless Backup uses the Extended Copy command compliant with T10/99-143rl to allow a "copy manager" (the FibreBridge) to execute all of the read and write operations necessary to move data. Blocks of data are moved directly from the Fibre Channel storage through the bridge to SCSI tape or from SCSI storage through the bridge to the SCSI tape, all at Fibre Channel and SCSI speeds.

CLI commands are case insensitive (upper and lower case allowed anywhere).
Commands generally follow a standard format:
[Get | Set] Command [Parameter 1 | Parameter 2] followed by the return or enter key

XCDevices

Allows the user to get information about the devices used in a particular Extended Copy command specified by the CmdNumber as presented in the XCStatus CLI command (see below).

Limits: *DeviceType* displays SCSI device type
VendorId, Product Id, SerialNumber display SCSI inquiry data for each device
DataDirection specifies whether a device is a data source, a data destination or both.

Action: **none**

Information: **get XCDevices [CmdNumber]**

Return: [lineCount]
DeviceType VendorID ProductID SerialNumber DataDirection
[SCSI type] [VendID] [ProdId] xxxxxxxxxxxxxxxx [DataDir]

XCError

Retrieves any SCSI sense data returned by an Extended Copy command because of an error.

Limits: *CmdNumber* is the data returned by the XCstatus command (see below).
SCSI Status, *SenseKey, ASC* and *ASCQ* fields display the sense data returned by the Extended Copy command
If a device also returns sense data, the device's serial number will be displayed in the *DeviceId* field; its data will be displayed in the *DStat, DSK, DASC* and *DASCQ f*ields.
Any field that does not contain valid data will be filled in with 00.

Action: **none**

Information: **get XCError [CmdNumber]**

Return: [lineCount]
SCSI status SenseKey ASC ASQ DeviceID DStat DSK DASC DASCQ
xx xx xx xx [SerNum] xx xx xx xx

XCStatus

Polls the status of Extended Copy commands issued to the FibreBridge.

Limits: *CmdNumber* is unique identifier for a particular command.
ListId displays List ID specified in the CDB of the extended copy command.
HostId field displays 8-byte Node Name of FC host that issued Extended Copy command
Status indicates current state of Extended Copy command [Initializing|Active|Done|Error}
Transferred displays the amount of data transferred in megabytes.

Action: none

Information: get XCStatus

Return: [lineCount]
CmdNumber ListID HostId Status Transferred (MB)
[CmdNumber] [xxxx] [host NN] [cmd status] [xxxxxxxx]

Serverless backup commands

8.2 FibreBridge menu provides CLI interface

Configuration of many models of the ATTO FibreBridge is available via a menu which contains most commands available through CLI but in a hierarchical user-friendly format. It follows a standard menu/choice model.

Configuration of the FibreBridge includes displaying and modifying various attributes of FibreBridge operation, as well as the update of firmware. The menu system provides access to ATTO FibreBridge services in a standard menu/choice model, and displays options and current status.

Accessing the menu

1. **Communicate with the FibreBridge through in-band SCSI over Fibre Channel, the RS-232 port or Telnet or FTP over Ethernet.**
2. **The Command Line Interface mode is available after the initial display is complete, ending with the word *Ready*.**
3. **Type *Menu* to enter the menu system.**

Conventions

Ellipses (...) show that a choice will lead to another menu. For example, if you choose a) on the FibreBridge Main Menu, you will see another menu, FibreBridge Configuration Menu. If you choose b) Fibre Channel Configuration, you will see a different menu, Fibre Channel Configuration Menu (see examples at right).

Brackets after a menu item show current settings. If you choose a) on the FibreBridge Configuration Menu (one level beyond the Main Menu) (see examples at right) you will see

FibreBridge Name [ ].

No ellipses follow: this is the last choice. If you wish to change the [ ], you type in your response to

Enter FibreBridge Name (Max of 8 characters)

In the FibreChannel Configuration Menu, choosing Port Connection Mode (loop) presents you with the following:

This option determines the port type to which the FibreBridge will attempt to login. Loop Mode allows Arbitrated Loop (FC_AL) logins via a FL_Port. Point-to-Point Mode (ptp) allows connection to a fabric port (F_Port).
Type the letter of your choice and press 'Enter'.
Connection Mode: a) Loop, b) Point-to-Point:"

Typing "a" will enable loop mode, typing "b" will enable point-to-point mode.

Examples

```
FibreBridge Main Menu
---------------------------------
a) FibreBridge Configuration...
b) FibreBridge Maintenance...
c) FibreBridge Diagnostics...
d) Save / Restore Configuration....
x) Ext Menu Mode
Enter a-d or x:

*** Choice a) ***
FibreBridge Configuration Menu
-----------------------------------------------
a) FibreBridge Name [               ]
b) Fibre Channel Configuration...
c) SCSI Port Configuration...
d) Routing Configuration...
e) Serial (RS-232) Port Configuration...
f) Network Configuration...
x) Return to previous menu...
Enter a-f or x:

*** Choice b) ***
Fibre Channel Configuration Menu
-----------------------------------
a) Port Connection Mode [loop]
b) FC-AL Arbitration Fairness [enabled]
c) Fibre Channel Frame Length [2048]
d) Full Duplex Mode [enabled]
e) List Fibre Channel Ports
f)  Unprocessed SCSI Command Returns [busy]
g) FC-AL Hard Addressing Mode [disabled]
h) Fibre Channel Class 2 service [disabled]
i)  Fibre Channel ACK0 acknowledgements
[disabled]
j)  Fibre Channel Initiator Mode [enabled]
k) Fibre Channel Port 0 Configuration...
x) Return to previous menu...
Enter a-m or x:
```

8.3 ATTO BridgeTools provides graphical interface

The simplest way to communicate with the ATTO FibreBridge is to use ATTO BridgeTools, a Java-based graphical interface configuration utility designed to flash firmware and manage the configuration for all models of the FibreBridge.

Configuration of the FibreBridge includes displaying and modifying various attributes of FibreBridge operation, as well as the update of firmware. BridgeTools detects which FibreBridge model is available and presents you with the applicable configuration options.

The BridgeTools program currently supports Windows7 95/98, NT, and 2000, Sun Solaris™ and Mac7 OS 9.1 and earlier.

Communicate with the FibreBridge either through in-band SCSI over Fibre Channel, the RS-232 port or Telnet or FTP over Ethernet.

Select in-band connection direct over the Fibre Channel link, RS-232 port or Ethernet port.

A tabbed panel interface presents configuration parameters in a simple, one-window display. Message boxes, icons, drop-down boxes, menu bars and other common graphical constructs will lead you through the configuration process.

The ATTO BridgeTools Manual has complete instructions on how to install and operate the program.

8.4 In-band CLI using SCSI over Fibre Channel port

In-band Command Line Interface (CLI) configures and manages the ATTO FibreBridge using SCSI-based CLI commands over a fibre port connection.

In-band CLI allows a programmer to configure the FibreBridge while it is moving data. Using a programmer's interface, ATTO FibreBridge Services CLI commands, as described previously in this manual, may be implemented. The only command not available is *menu.*

In-band CLI is implemented as a device separate from the FibreBridge itself. It uses a different LUN than the FibreBridge, and reports as a Storage Enclosure Services (SES) device (device type 0x0D). This LUN is referred to as the ServicesLUN.

The ServicesLUN is visible on all fibre ports but is actually a single unit. The default fibre LUN for each fibre port's ServicesLUN is 0x08.

The ServicesLUN must be reserved for each Write Buffer/Read Buffer pair, using the SCSI Reserve command to insure integrity of the in-band CLI session.

1 **An initiator (host) sends a SCSI Reserve command to the ServicesLUN.**

   - If the ServicesLUN is not reserved by another initiator, the ServicesLUN is now reserved and ready to begin a new CLI session.
   - If the FibreBridge configuration is reserved by a different CLI session (i.e. serial or Telnet), the in-band session will not be allowed to modify the FibreBridge configuration. If you try, the results buffer of the ServicesLUN will return:

   Process X has the configuration reserved.

   ID of this session = Y

   Ready.

2 **The initiator issues a SCSI** WriteBuffer **(buffer ID = 0) command to the ServicesLUN. A** WriteBuffer **command must be accompanied by an ASCII buffer representing the CLI command string such as**

   set FibreBridgeName FB1180

3 **The ServicesLUN will execute the command line and created feedback in the form of ASCII characters into a buffer. This buffer is 8KB and circular. Retrieve the results by issuing a** ReadBuffer **command before issuing another** WriteBuffer **command.**

4 **A subsequent** WriteBuffer **command will execute the new command line and overwrite the previous results in the buffer with new results.**

5 **The ServicesLUN can be released by issuing a** SCSI Release **command to the Services LUN after each Write/Read Buffer pair, or multiple Write/Read Buffer pairs. (See Exhibit 8.4-1 for an example)**

I/O details

The buffer sent to the Services LUN during the data out phase of a Write Buffer command must be:

- ASCII data
- maximum 80 bytes length
- terminated with either a carriage return character (0x0D), line feed character (0x0A) or NULL character (0x00)
- Characters following the first carriage return character, line feed character or NULL character are ignored.

The buffer retrieved from the Services LUN during the data-in phase of a Read Buffer command will be:

- ASCII data
- maximum 8 KBytes (8192 bytes) in length
- terminated with a NULL character (0x00)

➔ Characters following the NULL character are meaningless.

A CHECK_CONDITION, INVALID_PARAMETER_IN_CDB will be returned to an initiator that specifies an incorrect Buffer ID, Mode, Length or Buffer Offset. The Mode is always Data (0x2), the Buffer ID is always 0 and the Buffer Offset is always 0.

Exhibit 8.4-1 The SCSI command process: reserve the FibreBridge, send the command, release the FibreBridge.

Initiator/Host		**FibreBridge**
Goal: reserve the FibreBridge for an in-band CLI command		
SCSI cdb: Reserve ServicesLUN	=>	
	<=	SCSI success
Goal: retrieve the FibreBridge temperature via in-band CLI		
1. Issue the command:		
SCSI cdb: WriteBuffer ServicesLUN, bid=0, “get Temperature\n”	=>	places “Temperature=28C\n\r” into the read-data buffer
	<=	SCSI success
2. Retrieve the results:		
SCSI cdb: ReadBuffer ServicesLUN, bid=0	=>	
	<=	Returns “Temperature=28C\n\r” from the read-data buffer
	<=	SCSI success
Goal: release the FibreBridge for other in-band users		
SCSI cdb: Release ServicesLUN	=>	
	<=	SCSI success

9 Serverless backup support

Serverless Backup is an application that allows data to be copied between two storage devices (Fibre Channel disks, SCSI disks and SCSI tapes) with minimal intervention from a server.

As the volume of data on a network grows, the resources required to back up this data also grow. Data protection requires that large volumes of data be copied from on-line storage devices to dedicated archive devices. This places a very heavy load on the host processors, I/O busses, memory busses, and front-end network, thus reducing the servers ability to "serve" its clients, as well as a general reduction in performance.

Serverless Backup uses the Extended Copy command compliant with T10/99-143rl to allow a "copy manager" (the FibreBridge) to execute all of the read and write operations necessary to move data. Blocks of data are moved directly from the Fibre Channel storage through the bridge to SCSI tape or from SCSI storage through the bridge to the SCSI tape, all at Fibre Channel and SCSI speeds (as compared to moving data across the Ethernet network).

The ATTO FibreBridge will execute Extended Copy commands to and from SCSI tape drives connected directly to the FibreBridge. The hard drives you are backing up or restoring to can be anywhere on the Storage Area Network, including SCSI drives attached to the bridge. The Extended Copy command contains target and segment descriptors used to define which data is to be moved between which devices.

Target Descriptors allow the host to describe the devices involved in the Extended Copy. To be compatible with all copy agent application packages, the FibreBridge implementation supports World Wide Name, N_Port ID, and WWN plus N_Port ID descriptor types.

Segment Descriptors describe the data to copy and how much of it to copy. The two most common types of Segment Descriptors are "block (disk) to stream (tape)" and "stream (tape) to block (drive)". The FibreBridge supports "block to block," "stream to stream," "inline to stream," and "stream to discard.".

The FibreBridge will support copying up to 830 Megabytes of data in a single Extended Copy command. Larger files must be backed up or restored using additional operations. The bridge can support up to two simultaneous Extended Copy commands.

Please check the ATTO Technology, Inc. web site at www.attotech.com for a complete list of all of the applications supported as well as detailed installation and configuration tips.

How serverless backup works

1. **A copy "agent" on the server provides a user interface to begin a backup or restore operation as well as manage and synchronize the movement of data sets. This copy agent is either included or available as an add-on with many high-end tape backup software applications on the market.**
2. **The server sends a single Extended Copy command to the FibreBridge or to a SCSI device beyond the bridge.**
3. **The bridge interprets the segment descriptors and issues read commands to the appropriate devices.**
4. **Once enough data is read, the bridge will issue write commands to the appropriate device.**
5. **Once all of the segment descriptors have been executed, the bridge will send status to the copy agent running in the server. The data never passes through the server, thus freeing the CPU and Memory to process other requests.**

To enable serverless backup on the FibreBridge:

1. **Access the FibreBridge either through RS-232 or Ethernet.**
2. **After the** *Ready* **prompt, type** *set Fcinitiator enabled***.**
3. **At the next** *Ready* **prompt, type** *saveconfiguration restart***.**
4. **The FibreBridge is now ready to perform serverless backup.**

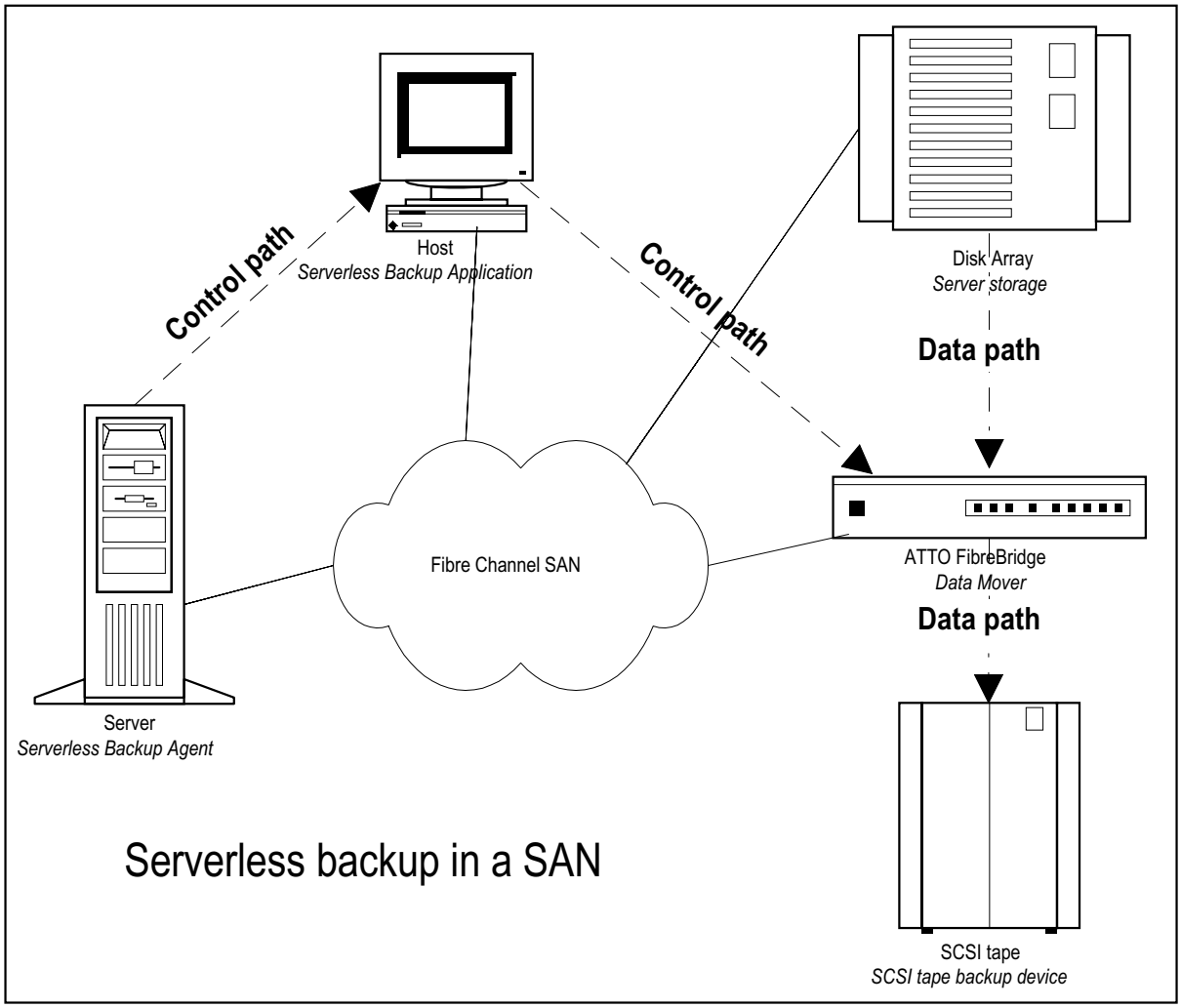


Exhibit 9-1 Once the server sends a command to the FibreBridge for extended copy, the FibreBridge manages the backup procedure, by-passing the server.

10 Updating firmware

The ATTO FibreBridge has several processors which control the flow of data. The firmware to control these processors can easily be upgraded in the field using the WriteBuffer *command over the in-band Fibre Channel connection, or* ZModem *utility over an RS-232 serial connection.*

The FibreBridge firmware is a compressed .JAR file available on the ATTO Technology, Inc. web site at www.attotech.com.

To use the ZModem command over the RS-232 serial link to load new firmware:

1. **Uncompress the.JAR file obtained from the ATTO Technology Inc. website (www.attotech.com) into an image file (.IMA).**

   Note: the .JAR file can be uncompressed using any utility that supports the "zip" format.

2. **Load a Terminal Program such as Hyper Terminal.**
3. **Set the terminal and the FibreBridge for the highest possible baud rate for your terminal. Default parameters are: 9600 baud, N, 8, 1 no handshaking and ASCII Terminal.**
4. **Turn on power to the FibreBridge.**
5. **Once the Ready prompt appears, type** ZMODEM RECEIVE**. The FibreBridge will display that it is preparing to receive a file from your terminal program.**
6. **On the terminal program, choose** Transfer Send File
7. **In the Send File Box, enter the current FibreBridge .ima file or click the browse button to find it**
8. **Click** Send File
9. **The FibreBridge should acknowledge receiving the file and display a message not to interrupt power for 90 seconds.**

***Do not* interrupt the flash process.**

***Do not* power down the host or the FibreBridge until the display returns the *Ready* prompt.**

Interrupting the flash process will make your FibreBridge inoperable and you will have to return it to ATTO Technology for repair.

10. **Once the download is complete, cycle power on the FibreBridge to invoke the new firmware.**

WARNING Do not interrupt the flash process. Do not power down the host or the FibreBridge until the display returns the *Ready* prompt. Interrupting the flash process will make your FibreBridge inoperable and you will have to return it to ATTO Technology for repair.

Index Command Line Interface commands

Appendix A POST information

POST, *or power-on self test, is a set of routines which tests various system components to see if they are properly connected and operating. The display appears on the host after power is applied to the FibreBridge 1180E/D connected to it. Type* menu *to enter the menu system: type* help *for a list of CLI commands.*

```
ATTO FibreBridge 1180
Stepping test            Passed
Onchip memory test       Passed
Error log empty
00000040 MB of SDRAM installed
SW Opt Jumper = 00000040
Dram walking bit test    Passed
Dram 1 and 0 test        Passed
Dram address test        Passed

Testing FibreChannel Port 0...
ISP2200 Configspace test Passed
ISP Reset test           Passed
ISP Reg Read/Write test  Passed
ISP Mailbox test         Passed
ISP SRAM test            Passed
ISP SRAM Address test    Passed
ISP Master 00010002 test Passed
ISP Master 5555aaaa test Passed
ISP Master 0000ffff test Passed

Testing SCSI Port 0
SYM895A Configspace test Passed
SYM895A Reg R/W test     Passed
SYM895A Revision test    Passed
SYM895A Reset test       Passed
SYM895A FIFO test        Passed
SYM895A Loopback test    Passed
SYM895A Master test      Passed
Diagnostics completed successfully
SCSI port 1 ID: 7
Mar  8 2001 16:13:36 002W Initialization Complete



     ATTO FibreBridge 1180
(c) 2001 ATTO Technology, Incorporated.

Firmware version 002W release date Mar  8 2001, 16:13:36 Build 002W

PowerOn SelfTest Completion Status: GOOD
64 Megabytes of RAM Installed.

1 1.0624 Gb/s Fibre Channel Interfaces.
1 LVD SCSI Interface Ports.

Interface 0 World Wide Name = 20 00 00 10 86 10 00 00

FibreBridge Serial Number = "FB1180L000000”
FibreBridge Name = "        “
ErrorLog Contents:  NO ERRORS
For help, type HELP.

Ready.
```

Appendix B Examples of command use

RouteXxxxx commands

Following are samples of the RouteXxxxx command interaction showing actual commands and their output to the Services port.

```
Ready.
ScsiPortList
 2
;SCSI Port    Port Status
  0          O.K. | Disabled | Failed

Ready.
FcPortList
 2
;Fibre Port   Port Status
  0          O.K. | Failed

Ready.
set RouteOffline 0 3

Ready.
get RouteOffline 0 3
;fp fl sb st sl On/Offline
  0  3  0  0  0 Offline

Ready.
RouteChange 0 3 0 0 0

Ready.
set RouteOnline 0 3

Ready.
get RouteOnline 0 3
;fp fl sb st sl On/Offline
  0  3  0  0  0 Online

Ready.
RouteDisplay 0 3
  3
;fp fl sb st sl On/Offline
  0  3  0  0  0 Online
 xx xx  0  7  0 Reserved

Ready.
RouteDisplay 0 online
  6
;fp fl sb st sl On/Offline
  0  0  0  3  0 Online
  0  1  0  3  1 Online
  0  2  2  0  0 Online
  0  3  3  0  0 Online  0  4 xx xx xx 1180
 xx xx  0  7  0 Reserved

Ready.
RouteDisplay online
 6
;fp fl sb st sl On/Offline
  0  0  0  3  0 Online
  0  1  0  3  1 Online
  0  2  2  0  0 Online
  0  3  3  0  0 Online0  4 xx xx xx 1180
 xx xx  0  7  0 Reserved

Ready.
RouteDisplay 0
 34
;fp fl sb st sl On/Offline
  0  0  0  3  0 Online
  0  1  0  3  1 Online
  0  2  2  0  0 Online
  0  3  3  0  0 Online
  0  4 xx xx xx 4500
  0  5 xx xx xx Offline
  0  6 xx xx xx Offline
..
  0 30 xx xx xx Offline
  0 31 xx xx xx Offline
 xx xx  0  7  0 Reserved

Ready.
RouteDisplay
 34
;fp fl sb st sl On/Offline
  0  0  0  3  0 Online
```

```
 0  1  0  3  1 Online
 0  2  2  0  0 Online
 0  3  3  0  0 Online
 0  4 xx xx xx 4500
 0  5 xx xx xx Offline
 0  6 xx xx xx Offline
..
 0 30 xx xx xx Offline
 0 31 xx xx xx Offline
xx xx  0  7  0 Reserved

Ready.
set RouteOffline 0 0

Ready.
get RouteOffline 0 0
;fp fl sb st sl On/Offline
 0  0  0  3  0 Offline

Ready.
set FibreBridgeTargetLUN 0 0

Ready.
get RouteOnline 0 0
;fp fl sb st sl On/Offline
 0  0 xx xx xx 4500

Ready.
get FibreBridgeTargetLUN 0
 2
;fp fl
 0  0

Ready.
set ScsiInitId 0 0

Ready.
get ScsiInitId 0
Port 0 ScsiInitId = 0

Ready.
RouteDisplay 0 1
 3
;fp fl sb st sl On/Offline
 0  1 xx xx xx Offline
xx xx  0  7  0 Reserved
```

AutoMap Command Sequences

The following are examples of typical command sequences used in issuing an AutoMap command. Both the actual commands as well as their output to the Services port are shown.

```
Ready.
ScsiPortList
 2
;SCSI Port    Port Status
 0          O.K.

Ready.
FcPortList
 2
;Fibre Port   Port Status
 0          O.K.

Ready.
RouteDisplay online
 3
;fp fl sb st sl On/Offline
 0  0  0  0  0 Online
 0  7 xx xx xx 1180
xx xx  0  7  0 Reserved

Ready.
AutoMap
Setting device offline: FC 0 Lun  0.
Setting device offline: FC 0 Lun  1.
Setting device offline: FC 0 Lun  2.
Setting device offline: FC 0 Lun  7.
Scanning SCSI bus 0
SCSI bus 0 scan complete.

Ready.
RouteDisplay online
 6
;fp fl sb st sl On/Offline
```

```
 0  0  0  0  0 Online
 0  1  0  2  0 Online
 0  2  0  3  0 Online
 0  3 xx xx xx 4500
xx xx  0  7  0 Reserved

Ready.
ScsiPortList
 2
;SCSI Port    Port Status
 0          O.K. | Failed | Disabled

Ready.
FcPortList
 2
;Fibre Port   Port Status
0             O.K. | Failed

Ready.
RouteDisplay online
 6
;fp fl sb st sl On/Offline
 0  0  0  0  0 Online
 0  1  1  4  0 Online
 0  2  2  2  0 Online
 0  3 xx xx xx 1180
xx xx  0  7  0 Reserved

Ready.
AutoMap 0 2
Setting device offline: FC 0 Lun  0.
Setting device offline: FC 0 Lun  1.
Setting device offline: FC 0 Lun  2.
Setting device offline: FC 0 Lun  7.
Scanning SCSI bus 0
SCSI bus 0 scan complete.

Ready.
RouteDisplay online
 6
;fp fl sb st sl On/Offline
 0  0  0  0  0 Online
 0  1  0  2  0 Online
 0  2  0  3  0 Online
3 xx xx xx 1180
 xx xx  0  7  0 Reserved
```

Appendix B

Appendix C Standards and compliances

The equipment described in this manual generates and uses radio frequency energy. If this equipment is not used in strict accordance with the manufacturer's instruction, it can and may cause interference with radio and television reception. See the Technical Specification sheet for a particular ATTO FibreBridge for a full list of certifications for that model.

FCC Standards: Radio and Television Interference

WARNING This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide a reasonable protection against such interference when operating in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

If this equipment does cause interference to radio and television reception, which can be determined by turning the equipment off and on, try to correct the interference by one or more of the following measures:

- Move the receiving antenna.
- Relocate the bridge with respect to the receiver, or move the bridge away from the receiver.
- Plug the bridge into a different outlet so the bridge and receiver are on different branch circuits.
- If necessary, consult an ATTO authorized dealer, ATTO Technical Support Staff, or an experienced radio/television technician for additional suggestions.

The booklet *How to Identify and Resolve Radio/TV Interference Problems* prepared by the Federal Communications Commission is a helpful guide. It is available from the US Government printing office, Washington, DC 20402, Stock No. 004-000-00345-4.

Further results of FCC Testing

“In certain instances, extraordinary variances in the AC power supplied to this unit will require the operating system's normal error recovery procedure to retry the current SCSI command. In this case, the unit can fully recover with no loss of data, and without user intervention. Note that other exceptional conditions in addition to variances in the AC power, such as improper cabling or unrecognized commands, may also trigger these normal error recovery procedures.”

Canadian Standards

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Regulations.

Cet appareil numerique de la classe A respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.

European Standards

Declaration of Conformity

This following statement applies to the ATTO FibreBridge.

This device has been tested in the basic operating configuration and found to be compliant with the following European Union standards:

Application of Council Directive: 89/336/EEC

Standard(s) to which conformity is declared: EN55022, EN50082-1

This Declaration will only be valid when this product is used in conjunction with other CE approved devices and when the entire system is tested to the applicable CE standards and found to be compliant.

Appendix D Fibre Channel Accessories

The following Fibre Channel accessories are available through ATTO Technology. Contact an ATTO Technology authorized sales representative to order.

Embedded

FibreBridge 1180

FCBR-1180-ELC Fibre Channel to LVD Ultra2 SCSI Bridge Embedded Board with Copper DB9
FCBR-1180-ELS Fibre Channel to LVD Ultra2 SCSI Bridge Embedded Board with Optical SC

FibreBridge 1190

FCBR-1190-ELC Fibre Channel to LVD Ultra2 SCSI Bridge Embedded Board with Copper DB9
FCBR-1190-ELS Fibre Channel to LVD Ultra2 SCSI Bridge Embedded Board with Optical SC

FibreBridge 2300

FCBR-2300-EL0 2-gigabit Fibre Channel to HVD Ultra SCSI Bridge Embedded Board

FibreBridge 3300

FCBR-3300-EL0 2-gigabit Fibre Channel to HVD Ultra SCSI Bridge Embedded Board

FibreBridge 4500

FCBR-4500-CH0 Fibre Channel to HVD Ultra SCSI Bridge CPCI Board
FCBR-4500-CL0 Fibre Channel to LVD Ultra2 SCSI Bridge CPCI Board

Destop/Rackmount

FibreBridge 2200

FCBR-2200-DH0…… Fibre Channel to HVD Ultra SCSI Bridge Desktop or Rackmount
FCBR-2200-DL0…… Fibre Channel to LVD Ultra2 SCSI Bridge Desktop or Rackmount

FibreBridge 2300

FCBR-2300-DL0 2-Gigaabit Fibre Channel to HVD Ultra SCSI Bridge Desktop or Rackmount

FibreBridge 4500

FCBR-4500-DH0 Fibre Channel to HVD Ultra SCSI Bridge Desktop or Rackmount
FCBR-4500-DL0 Fibre Channel to LVD Ultra2 SCSI Bridge Desktop or Rackmount

ATTO FC Rack System (build to order)

FC Rack Enclosures with Power Supplies

FCRS-BAS1-000…… Rack System with Single Power Supply
FCRS-BAS2-000…… Rack System with Redundant Power Supplies

FibreBridge 3200

FCBR-3200-RH0…… ATTO FibreBridge 3200R HVD
FCBR-3200-RL0…… ATTO FibreBridge 3200R LVD

FibreBridge 3300

FCBR-3300-000 2-Gigabit Fibre Channel to HVD Ultra SCSI Bridge

Field Replacement Units (FRU)

PWRA-0000-FRU Power Module for ATTO FC Rack System
FCBR-3200-RHF… ATTO FibreBridge 3200R HVD Replacement Unit
FCBR-3200-RLF ATTO FibreBridge 3200R LVD Replacement Unit

MIAs

ADAP-MIAS-BLK	MIA Adapter-Short Wave

GBICS

GBIC-DB90-000	GBIC – DB9 Active Copper Interface
GBIC-HSDC-000	GBIC – HSSDC Active Copper Interface
GBIC-SWFO-000	GBIC – Short Wave Optical Duplex SC Interface
SFP2-0000-000	SFP – Optical LC

Cables/Copper

CBL-FCCU-003	DB9 Copper Fibre Channel Cable (Unequalized) – 3m.
CBL-FCCU-010	DB9 Copper Fibre Channel Cable (Unequalized) – 10m.
CBL-FCCE-020	DB9 Copper Fibre Channel Cable (Equalized) – 20m.
CBL-HSDB-003	HSSDC to DB9 Copper Fibre Channel Cable (Unequalized) – 3m.
CBL-HSDB-010	HSSDC to DB9 Copper Fibre Channel Cable (Unequalized) – 10m.
CBL-HSHS-003	HSSDC to HSSDC Copper Fibre Channel Cable (Unequalized) – 3m.
CBL-HSHS-010	HSSDC to HSSDC Copper Fibre Channel Cable (Unequalized) – 10m.

Cables/Optical

CBL-FCFI-005	5 Meter Cable-Duplex 50 Micron Multi-mode FC/Optical
CBL-FCFI-010	10 Meter Cable-Duplex 50 Micron Multi-mode FC/Optical
CBL-FCFI-030	30 Meter Cable- Duplex 50 Micron Multi-mode FC/Optical

Cables/FibreChain

CBL-FCFC-001	FibreChain 24” Cable

Cables/SCSI

CBL-FP68-C3	68-pin “P” / 50-pin Centronics – 1m
CBL-FP68-C6	68-pin “P” / 50-pin Centronics – 2m
CBL-FP68-C25	68-pin “P” / 50-pin Centronics – 8m
CBL-FP68-C79	68-pin “P” / 50-pin Centronics – 24m
CBL-F68E-00X	68-pin “P” / 68-pin fine pitch “P” – 1ft
CBL-U68E-681	68-pin “P” / 68-pin fine pitch “P” – 1m
CBL-F68E-686	68-pin “P” / 68-pin fine pitch “P” – 2m
CBL-F68E-003	68-pin “P” / 68-pin fine pitch “P” – 3m
CBL-F68E-010	68-pin “P” / 68-pin fine pitch “P” – 10m
CBL-F68E-025	68-pin “P” / 68-pin fine pitch “P” – 25m
CBL-F68E-68X	68-pin “P” / 68-pin fine pitch “P” – 16m.
CBL-V68E-48	68-pin offset VHDCI to 68-pin VHDCI

Appendix E How to Contact ATTO Technology, Inc.

Customer service, sales information and technical support are available by phone Monday through Friday, Eastern Standard Time 8:00 a.m. to 8:00 p.m., or by fax and web site 24-hours a day.

ATTO Technology, Inc.
155 CrossPoint Parkway
Amherst, New York 14068
(716) 691-1999 • voice
(716) 691-9353 • fax
http://www.attotech.com

ATTO Technology can also be reached via e-mail at the following addresses:

Sales Support: sls@attotech.com
Technical Support: techsupp@attotech.com